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Indian Standard

ELECTROTECHNICAL VOCABULARY

PART III ACOUSTICS

Section 7 Music

UDC 001·4 : 534·3

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ELECTROTECHNICAL VOCABULARY

PART III ACOUSTICS

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ELECTROTECHNICAL VOCABULARY

PART III ACOUSTICS

Section 7 Music

0. FOREWORD

0.1 This Indian Standard (Part III/Sec 7) was adopted by the Indian Standards Institution on 27 February 1978, after the draft finalized by the Basic Standards on Electronics and Telecommunication Sectional Committee in consultation with the Acoustics Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 Attempt has been made in this standard to standardize terms and definitions related to music.

0.3 Indian musical terms differ widely from those of Western music. Attempts have been made to include certain Indian musical terms.

0.4 The corresponding Hindi equivalent for the Western musical terms are given in Appendix A. It also include some of the Indian musical terms for which English equivalent is not available and hence the transliterations are given under the column of English term.

0.5 While preparing this standard, assistance has been derived from the IEC Document No. 29 (IEV-08) (Secretariat) 100 International Electrotechnical Vocabulary (3rd Edition) Group 08: Electro-acoustics particularly from Section 08-35, issued by the International Electrotechnical Commission.

1. SCOPE

1.1 This standard (Part III/Sec 7) covers terms relating to musical acoustics.

2. TERMS AND DEFINITIONS

2.1 Tone — (*See also* **2.15**)

a) Sound wave capable of exciting an auditory sensation having pitch.

b) Sound sensation having pitch.

2.2 Simple Tone/Pure Tone

a) A sound in which sound pressure varies sinusoidally with time.

b) Sound sensation characterized by its singleness of pitch.

2.3 Complex Tone

a) Sound wave containing simple sinusoidal components of different frequencies.

b) Sound sensation characterized by more than one pitch.

NOTE — Whether or not a listener perceives a tone as simple or complex is dependent upon ability, experience and listening attitude.

2.4 Fundamental — Component of a periodic wave having the lowest frequency.

2.4.1 An integrator and rest note for all melodic progressions used in music.

NOTE 1 — The tonic is a psychological feature which when externalized in the form of physical sound becomes the drone.

NOTE 2 — In Indian music both the tonic and drone are included in the term 'shadjatva' (षड्जत्व), particularly tonic.

2.5 Partial — A harmonic component of a complex tone.

NOTE 1 — Component of a sound sensation that may be distinguished as a pure tone which cannot be further analysed by the ear and that contributes to the timbre of the complex sound.

NOTE 2 —The term 'overtone' has often been used in place of harmonic but so numbered that the (n-1)th overtone is the same as the nth harmonic. Use of 'overtone' is now deprecated.

2.6 Harmonic — A sinusoidal component having a frequency which is an integral multiple of the fundamental frequency of a periodic wave quantity.

2.7 Harmonic Series of Sounds — Series of sounds in which each fundamental frequency in the series is an integral multiple of the lowest fundamental frequency.

2.8 Note — Conventional term used to indicate the pitch, or the duration, or both, of a tone. It is also the tone sensation itself or the oscillation causing the sensation.

2.9 Timbre — That subjective attribute of a sound which enables a listener to judge two sounds having the same pitch and loudness and to be dissimilar.

NOTE — Timbre depends primarily on the spectrum of sound but it also depends on the waveform, the sound pressure, the frequency location of the spectrum and the temporal characteristics of sound.

2.10 Vibrato — Family of tonal effects in music that depend on periodic variations of one or more characteristics of a sound wave such as frequency primarily, and amplitude or phase at a rate in the vicinity of six hertz.

NOTE — A tremolo is primarily an amplitude variation.

2.11 Interval — Spacing in (a) pitch [*see also* **2.2** of IS : 1885 (Part III/ Sec 5)-1966*] and (b) frequency between two sounds, whichever is indicated by the context. The frequency interval is described by the ratio of the frequencies or by a logarithm of this ratio.

2.12 Octave

a) Pitch interval between two tones such that one tone may be regarded as duplicating the basic musical impart of the other tone at the nearest possible higher pitch.

b) Frequency interval beween two sounds whose basic frequency ratio is two. The interval in octaves between frequencies f_2 and f_1 is $\log_2 (f_2/f_1)$.

2.13 Semitone (Semit, Half-Step) — Interval between two sounds having a basic frequency ratio approximately $2^{1/12}$, and exactly so in equal temperament. The interval, in equally tempered semi-tones between frequencies f_2 and f_1 is $12 \log_2 (f_2/f_1)$.

2.14 Quarter Tone — Under consideration.

2.15 Tonal Interval

a) Interval of two consecutive semitone (tempered scale).

b) Interval of two tones having frequency ratios of 9: 8 or 10 : 9.

2.16 Savart — A measure of musical intervals. The number of savarts in an interval (f_1/f_2) is given as:

$$S = 1\,000 \log_{10} (f_1/f_2)$$

Example — Number of savarts in an octave:

$$\begin{aligned} S &= 1\,000 \times \log_{10} 2/1 \\ &= 1\,000 \times 0{\cdot}3010 = 301. \end{aligned}$$

2.17 Sruti — The minimum change or interval normally detectable in musical pitch. This broadly corresponds to a microtone [of ratio 887 : 886 (Sikshma)] in a tempered scale.

NOTE — This term is also popularly used to devote ādhār svar, ek-sruti and pramāna sruti.

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*Electrotechnical vocabulary: Part III Acoustics, Sec 5 Speech and hearing.

2.17.1 *Ek-Sruti* — This corresponds approximately to a quarter tone interval on a tempered scale.

2.17.2 *Dvi-Sruti* — This corresponds approximately to a semitone interval on a tempered scale.

2.18 Cent — Interval between two sounds whose basic frequency ratio is 2·1/1 200.

2.19 Pythagorean Scale — Musical scale whose frequency intervals are represented by ratios of integral powers of 3 and 2 (*see* Table 1).

2.20 Just Scale — Musical scale formed by octave rearrangement of the notes of three consecutive triads each with the frequency ratio 4 : 5 : 6 or 10 : 12 : 15 (*see* Table 1).

2.21 Equally Tempered Scale — Musical scale formed usually by division of the octave into 12 equal intervals (*see* Table 1).

2.22 Standard Tuning Frequency (Standard Musical Pitch) — Frequency, for the note A in the treble stave, of 440 Hz.

TABLE 1 INTERVAL COMPARISON IN DIFFERENT MATHEMATICAL TUNING SYSTEMS

(*Clauses* 2.19, 2.20 *and* 2.21)

Name of Interval	Hindustani Music	Karnatak Music	Pythagorean			Equally Tempered		Just			Savarts	Srutis from S
			Origin	Ratio	Cents	Ratio	Cents	Origin	Ratio	Cents		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Unison	Shadja (षड़ज)	Shadjam (षड़जम)	1 : 1	1·000	0·00	1·000	0	1 : 1	1·000	0·00	0·00	0·00
Minor Second	Komal rishabh (कोमल ऋषभ)	Suddha rishabham (शुद्ध ऋषभम)	$2^8 : 3^5$	1·053	90·23	1·059	100	16 : 15	1·067	111·73	28	2
Lesser Major Second	Suddha (Trisruti) rishabh [शुद्ध (त्रिश्रुति) ऋषभ]	Trisruti rishabham, Suddha gandharam (त्रिश्रुति ऋषभम, शुद्ध गांधारम)	$3^2 : 2^3$	1·125	203·91	1·122	200	10 : 9	1·111	182·40	46	3
Greater Major Second	Suddha (Chatussruti) rishabh [शुद्ध (चतुष्श्रुति) ऋषभ]	Chatussruti, rishabham, Suddha gandharam (चतुष्श्रुति, ऋषभम, शुद्ध गांधारम)	$3^2 : 2^3$	1·125	203·9	×	×	9 : 8	1·125	203·91	51	4
Minor Third	Komal gandhar (कोमल गांधार)	Shatsruti rishabham, Sadharama gandharam (शतश्रुति ऋपभम, साधारण गांधारम)	$2^5 : 3^3$	1·186	294·14	1·189	300	6 : 5	1·200	315·64	78	6
Major Third	Suddha gandhar (शुद्ध गांधार)	Antara gandharam (अंतर गांधारम)	$3^4 : 2^6$	1·265	407·82	1·260	400	5 : 4	1·250	386·31	97	7
Perfect Fourth	Suddha madhyam (शुद्ध मध्यम)	Suddha madhyamam (शुद्ध मध्यमम)	$2^2 : 3$	1·333	498·05	1·335	500	4 : 3	1·333	498·05	125	9
Augmented Fourth	Teevra madhyam (तीव्र मध्यम)	Prati madhyamam (प्रति माध्यमम)	$3^6 : 2$	1·422	611·73	1·414	600	45 : 32	1·406	590·22	148	11
Diminished Fifth	Teevra madhyam (तीव्र मायम)	Prati madhyamam (प्रति माध्यमम)	$2^{10} : 3^6$	1·407	588·27	1·414	600	64 : 45	1·422	609·78	153	11
Perfect Fifth	Pancham (पंचम)	Panchamam (पंचमम)	3 : 2	1·500	701·96	1·498	700	3 : 2	1·500	701·96	176	13
Minor Sixth	Komal dhaivat (कोमल धैवत)	Suddha dhaivatam (शुद्ध धैवतम)	$2^7 : 3^4$	1·580	792·18	1·587	800	8 : 5	1·600	813·69	204	15
Major Sixth	Suddha dhaivat (शुद्ध धैवत)	Trisruti dhaivatam, Suddha nishadam (त्रिश्रुति धैवतम, शुद्ध निषादम)	$3^3 : 2^4$	1·688	905·87	1·682	900	5 : 3	1·667	884·36	222	16
—	Suddha dhaivat (शुद्ध धैवत)	Chatussruti dhaivatam, Suddha nishadam (चतुश्रुति धैवतम, शुद्ध निषादम)	$3^3 : 2^4$	1·688	905·87	—	—	27 : 16	1·688	906	227	17
Minor Seventh	Komal nishad (कोमल निषाद)	Shatsruti dhaivatam, Kaisiki nishadam (शतश्रुति, धैवतम, कैशिकि निषादम)	$2^4 : 3^2$	1·778	996·09	1·782	1 000	7 : 4 (harmonic)	1·750	968·83	243	18
—	Komal nishad (कोमल निषाद)	Shatsruti dhaivatam or Kaisiki nishadam (शतश्रुति धैवतम अथवा कैशिकि निषादम)	$3^{51} : 2^{80}$	1·786	996·09	—	—	16 : 9 (grave)	1·778	996·09	250	18
—	Komal nishad (कोमल निषाद)	Kaisiki nishadam (कैशिकि निषादम)	$3^{10} : 2^{15}$	1·803	1017·60	—	—	9 : 5	1·800	1 017·60	255	19
Major Seventh	Suddha nishad (शुद्ध निषाद)	Kakali nishadam (काकलि निषादम)	$3^5 : 2^7$	1·900	1109·78	1·888	1 100	15 : 8	1·875	1 088·27	273	20
Octave	Tara shadja (तार षड़ज)	Tara shadjam (तार षड़जम)	2 : 1	2·000	1200·00	2·000	1 200	2 : 1	2·000	1 200·00	301	22

NOTE — The Hindustani and Karnatak musical terms given in column (2) and (3) respectively correspond to the Western musical terms given in column 1 of this table.

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APPENDIX A

(*Clause* 0.4)

CORRESPONDING HINDI EQUIVALENT FOR THE WESTERN MUSICAL TERMS

CLAUSE REFERENCE	ENGLISH TERMS	HINDI TERMS
2.1	Tone	नाद
2.2	Simple Tone/Pure Tone	असंकीर्ण या विशुद्ध नाद स्वर
2.3	Complex Tone	संकीर्ण नाद अथवा स्वर
2.4	Fundamental	आधारक
2.4.1	Tonic and Drone	आधार स्वर एवं आधार ध्वनि
2.5	Partial	अनुरणन नाद
2.6	Harmonic	गुणित ध्वनि संवाद
2.7	Harmonic Series of Sounds	गुणित संवादयुक्त नाद श्रेणी
2.8	Note	स्वरक
2.9	Timbre	ध्वनिगुणता, ध्वनि जाति
2.10	Vibrato	प्रकंपन
2.11	Interval	ध्वन्यन्तराल, अन्तराल
2.12	Octave	अष्टक, अष्टम स्वर, द्विगुज स्वर
2.13	Semitone (Semit, Half-Step)	अर्द्धस्वरक, अर्द्धस्वरान्तर
2.14	Quarter Tone	चतुर्थांश स्वरक, चतुर्थांश स्वरान्तर
2.15	Tonal Interval	स्वरान्तराल
2.16	Savart	सेवर्ट
2.17	Sruti	श्रुति
2.17.1	Ek-Sruti	एक श्रुति
2.17.2	Dvi-Sruti	द्वि श्रुति
2.18	Cent	सेन्ट
2.19	Pythagorean Scale	पाइथागोरियन स्वर ग्राम
2.20	Just Scale	समर्थित स्वर ग्राम
2.21	Equally Tempered Scale	समान्तर स्वर ग्राम
2.22	Standard Tuning Frequency (Standard Musical Pitch)	नियत तारता (प्रामाणिक तारता)

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1885	Electrotechnical vocabulary
(Part III/Sec 1)-1965	Acoustics, Section 1 Physical acoustics
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(Part III/Sec 5)-1966	Acoustics, Section 5 Speech and hearing
(Part III/Sec 6)-1967	Acoustics, Section 6 Acoustical instruments
(Part III/Sec 7)-1978	Acoustics, Section 7 Music
(Part III/Sec 8)-1974	Acoustics, Section 8 Architectural acoustics

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Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Conversion*
Force	newton	N	1 N = 0·101 972 kgf
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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